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chiefly to the presence of iron, which appears to be specially prejudicial. The second precaution is to re-melt the alloy two or three times. The first melting of 10 aluminium and 90 copper produces an alloy of excessive brittleness. Each successive melting, up to a certain point determined by the working, and particularly the forging, properties of the metal, improves its tenacity and strength. It is probable that after several meltings there will remain in combination with the copper a somewhat smaller proportion of aluminium than 10 per cent.

"The present price of the English made 10 per cent. Aluminium Bronze is *6s. 6d.* per lb., but there is reason to believe that, as the process of extracting the aluminium becomes more largely practised, and the demand for the metal increases, the price will fall. The above price is four or five times that of gun metal. A much smaller quantity, however, of the new alloy than of gun metal will give the same strength; and when it is considered how small a ratio the cost of the material bears to the cost of workmanship in refined apparatus, it will be found that even at the present price of the new alloy its cost is not prohibitory, whilst the advantages attending its use promise to outweigh the increased expenditure.

"In the foregoing paper, which I am aware is very imperfect and incomplete, I have sought no more than to contribute such an instalment of practical information regarding this remarkable material as may be of service to those, who, like myself, contemplate making use of it, of whom I trust there will be many, for by its use we shall, I venture to think, confer on such structures at once greater strength and less weight, and so diminish tension, flexure, and distortion, to an extent calculated sensibly to improve the higher order of instruments of physical research.

On the Solar Energy as manifested in the Autumn of 1861 *and a Portion of the Spring of* 1862. By W. R. Birt, Esq.

During the summer of 1860, both previous to and in connexion with the great outburst of solar energy, that occurred towards the end of June in that year, I noticed a very marked monthly maximum and minimum of solar spots; and while there existed indications of an intermittent action of the solar force, I was satisfied that the maxima and minima I had frequently noticed were dependent on the rotation of the Sun.

Regarding each group of spots, single spots, if unattended by smaller ones, or separate nuclei if they were sufficiently distinct to warrant the appellation, as centres of energy, I laid

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down from time to time curves of which the centres of energy were the ordinates.

Taking the solar meridian turned directly towards the Earth at noon of the 9th of July, 1861, equal to 270°, and employing the period of $27^{d}\ 7^{h}\ 10^{m}$ as that of the synodical rotation of the Sun, I set off 27 abscissa, each being distinguished by a Roman numeral I. to XXVII. preceded by the zero; and as the rotation of the Sun apparently carries a meridian about 13°·19 westwardly per diem, each ordinate may represent any solar meridian within the limits of 13°·19; thus the zero may represent any meridian between 353°·41 and 6°·59, and XIV. any one between 178°·02 and 191°·20, and so on.

I have the pleasure of submitting to the Society the curves of five synodical rotations from observations in August, September, and October, 1861, and April and May 1862.* Each presents a well-marked maximum, and the indications of minima are also apparent. The maxima are, without exception, acuminated, showing in each case not so much a diminution of energy as a removal from observation of the active solar surface by rotation.

The most instructive feature of the curves consists of the portions of the surface of the solar globe indicated as manifesting the greatest energy. 1861, August, the meridians 23° to 208° manifested the greatest energy during the period; indeed, a much greater activity than the opposite hemisphere. During the next rotation the energy was greatly subdued; the curve, nevertheless, exhibited *an increase* of force between 125° and 297°; and by projecting the September under the August curve, the similarity of features, as regards the increase and diminution of activity, is unmistakeable.

The October curve, after presenting us with a solar hemisphere perfectly quiescent, meridian 42° gives us increased action from 108° to 293°; indeed, there had been an increase of activity since 42° was central. Collecting these areas of increased energy, we have a portion of the solar surface extending over 274°, manifesting considerably more energy than the remaining portion of 86°. The following are the meridians of maxima:—August, 156°; September, 138°; October, 200°; and this extent of 62°, or thereabouts, may be regarded as the locality of greatest energy for those months, as referred to heliographic longitudes. The heliographic latitudes of solar energy are well known.

1862 the April curve exhibits subdued energy from meridians 14° to 173°, then increased energy to 332°, with a maximum at 292°. The May curve manifests during its earlier portion more activity than the April, with a minimum

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* The drawings of these curves were exhibited at the Meeting in June last.—ED.

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at 156°. This was the meridian of maximum in August, so that the activity on the hemisphere, of which 156° is the central meridian, is now greatly reduced: in fact, the direction of the curve is reversed. From this meridian the curve manifests increased energy. The two curves for April and May presents as perfect an agreement in their features as those of August, September, and October, 1861. At the present time the hemisphere of greatest energy is marked by the central meridian 300°, or thereabout.

On a remarkable Chain of Lunar Craters forming a portion of the Southern Boundary of the Mare Serenitatis. By W. R. Birt, Esq.

The chain of Craters I am about to describe is but very seldom seen. I have only obtained three good views of it during the last eighteen months, viz., in 1861, April 16; 1862, May 5 and October 29. It is situated on the southern border of the Mare Serenitatis, between the conspicuous Crater Menelaus and a promontory running into the apparently open space forming the common boundary of the Maria Tranquillitatis and Serenitatis. This promontory is known as the Promontorium Acherusia.

The interest attaching to this chain of Craters will depend most probably on its having been overlooked both by Schröter, and Beer and Mädler. Although the Craters are small (they are larger than those in the neighbourhood of Eratosthenes) and situated on a narrow wall of rock running between the Maria Tranquillitatis and Serenitatis (if it be not situated on the surface of the Mare Tranquillitatis), the wall of rock rising nearly perpendicularly from level surfaces on the north and south of it, yet the locality is sufficiently remarkable, combined with the rarity of catching a sight of the Craters, to render it important to place a notice of their existence on record in the archives of this Society.

I first saw them in the year 1861, on April 16, my observations extending from 8 hours to 9·30, Greenwich Mean Time. The following is a quotation from my Journal of that date:—

"The Mare Serenitatis is separated from the Mare Tranquillitatis by a well-defined steppe, the Serenitatis being at the lower level.* From the Apennines, past Menelaus, to a point opposite Plinius, the border of the Mare Serenitatis is rugged, the highest portion of the wall from Menelaus to the terminating point consisting of a chain of small Craters—they are on the surface of the Mare Tranquillitatis, and appear at this epoch exceedingly interesting from their proximity to each other, the

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* This steppe is admirably shown on one of Mr. De La Rue's photographs.